AMENDMENTS TO THE CLAIMS

Amendments to the claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

1. (Previously Presented) A method for analyzing at least one of bone mineral density, bone structure and surrounding tissue comprising:

a. obtaining an image of a subject;

b. locating a region of interest on the image;

c. obtaining data from the region of interest; and

d. deriving quantitative data from the image data obtained at step c, wherein deriving includes extracting data from a measured parameter selected from the group consisting of: a volume of bone marrow edema; a volume of bone marrow edema normalized by at least one of width, area, size, and volume; a volume of osteophytes; a volume of subchondral cysts; a volume of subchondral sclerosis; an area of bone marrow edema; an area of osteophytes; an area of subchondral cysts; an area of subchondral sclerosis; a depth of bone marrow edema; a depth of osteophytes; a depth of subchondral cysts; a depth of subchondral sclerosis; at least one of a volume, area, and depth of at least one of an osteophytes, subchondral cysts, subchondral sclerosis wherein the at least one of volume, area, and depth is normalized by at least one of width, area, size, volume a bone proximal to at least one of the osteophyte, subchondral cyst, or subchondral sclerosis; a volume of menisci; a ratio of volume of normal to at least one of torn, damaged and degenerated meniscal tissue; a ratio of surface area of normal to at least one of torn, damaged and degenerated meniscal tissue; a ratio of surface area of normal to at least one of torn, damaged and degenerated meniscal tissue to total joint or cartilage surface area; a ratio of surface area of at least one of torn, damaged and degenerated meniscal tissue to a total surface area of at least one of joint and cartilage; a size ratio of opposing articular surfaces; a meniscal subluxation/dislocation in millimeters; an index combining different articular parameters; a 3D surface contour information of subchondral bone; an actual or predicted knee flexion angle during gait cycle; a predicted

knee rotation during gait cycle; a predicted knee displacement during gait cycle; a predicted load bearing line on cartilage surface during gait cycle and measurement of distance between load bearing line and at least one of cartilage defect and diseased cartilage; a predicted load bearing area on cartilage surface during gait cycle and measurement of distance between load bearing area and at least one of cartilage defect and diseased cartilage; a predicted load bearing line on cartilage surface during standing or different degrees of knee flexion and extension and measurement of distance between load bearing line and at least one of cartilage defect and diseased cartilage; a predicted load bearing area on cartilage surface during standing or different degrees of knee flexion and extension and measurement of distance between load bearing area and at least one of cartilage defect and diseased cartilage; a ratio of load bearing area to area of at least one of cartilage defect and diseased cartilage; a percentage of load bearing area affected by cartilage disease; a location of cartilage defect within load bearing area; a load applied to cartilage defect, area of diseased cartilage; and a load applied to cartilage adjacent to at least one of cartilage defect and area of diseased cartilage.

2. (Original) The method of claim 1 further including the step of enhancing image data extracted from the region of interest.

3. (Original) The method of claim 1 wherein the subject is a mammal.

4. (Original) The method of claim 1 wherein the subject is a human.

5. (Original) The method of claim 1 wherein the subject is a horse.

6. (Original) The method of claim 1 wherein the step of obtaining image data includes obtaining data from a measured parameter selected from the group consisting of: bone parameters, cartilage parameters, cartilage defect parameters, cartilage disease parameters, area parameters, and volume parameters.

7. (Cancelled)

8. (Cancelled)

9. (Previously Presented) A method for analyzing at least one of bone mineral density, bone structure and surrounding tissue comprising:

a. obtaining an image of a subject;

b. locating a region of interest on the image;

c. obtaining data from the region of interest; and

d. deriving quantitative data from the image data obtained at step c, wherein the image data is obtained of a hip and the step of deriving includes extracting data from a measured parameter selected from the group consisting of: microarchitecture parameters on structures parallel to stress lines; microarchitecture parameters on structures perpendicular to stress lines; geometry; shaft angle; neck angle; diameter of femur neck; hip axis length; largest cross-section of femur head; average thickness of cortical within at least one ROI; standard deviation of cortical thickness within at least one ROI; maximum thickness of cortical within at least one ROI; minimum thickness of cortical within at least one ROI; and hip joint space width.

10. (Withdrawn) A method for analyzing at least one of bone mineral density, bone structure and surrounding tissue comprising:

a. obtaining an image of a subject;

b. locating a region of interest on the image;

c. obtaining data from the region of interest; and

d. deriving quantitative data from the image data obtained at step c, wherein the image data is obtained from a region of a spine and the step of deriving includes extracting data from a measured parameter selected from the group consisting of: microarchitecture parameters on vertical structures; microarchitecture parameters on horizontal structures; geometry; superior endplate cortical thickness; inferior endplate cortical thickness; anterior vertebral wall cortical thickness; posterior vertebral wall

cortical thickness; superior aspect of pedicle cortical thickness; inferior aspect of pedicle cortical thickness; vertebral height; vertebral diameter; pedicle thickness; maximum vertebral height; minimum vertebral height; average vertebral height; anterior vertebral height; medial vertebral height; posterior vertebral height; maximum inter-vertebral height; minimum inter-vertebral height; and average inter- vertebral height.

11. (Cancelled)

12. (Previously Presented) A method for analyzing at least one of bone mineral density, bone structure and surrounding tissue comprising:

a. obtaining an image of a subject;

b. locating a region of interest on the image;

c. obtaining data from the region of interest; and

d. deriving quantitative data from the image data obtained at step c, wherein the step of deriving includes extracting bone parameters selected from the group consisting of: stainless steel equivalent thickness wherein the stainless steel equivalent thickness is determined as the average gray value of the region of interest expressed as thickness of stainless steel with equivalent intensity; trabecular contrast wherein the trabecular contrast is determined as one of the trabecular equivalent thickness and marrow equivalent thickness; fractal dimension; Fourier spectral analysis wherein the Fourier spectral analysis is determined as one of a mean transform coefficient absolute value and a mean spatial first moment; predominant orientation of spatial energy spectrum; at least one of trabecular area and total area; trabecular perimeter; trabecular distance transform; marrow distance transform; trabecular distance transform regional maxima values; marrow distance transform regional maxima values; star volume; trabecular bone pattern factor; connected skeleton count or trees (T); node count (N); segment count (S); node-to-node segment count (NN); node-to-free-end segment count (NF); node-to-node segment length (NNL) node-to-free-end segment length (NFL); free-end-to-free-end segment length (FFL); node-to-node total struts length (NN.TSL); free-end-to-free-ends total struts length (FF.TSL); total struts length (TSL); FF.TSL/TSL; NN.TSL/TSL; loop

count (Lo); loop area; mean distance transform values for each connected skeleton; mean distance transform values for each segment (Tb.Th); mean distance transform values for each node-to-node segment (Tb.Th.NN); mean distance transform values for each node-to-free-end segment (Tb.Th.NF); orientation of each segment; angle of each segment; angle between segments; length-thickness ratios (NNL/Tb.Th.NN) and (NFL/Tb.Th.NF); and interconnectivity index (ICI) ICI=(N*NN)/(T*(NF+1));

13. (Original) The method of claim 12 wherein total bone parameter factor is (P1-P2)/(A1-A2) further wherein P1 and A1 are the perimeter length and trabecular bone area before dilation and P2 and A2 corresponding values after a single pixel dilation, measure of connectivity

14. (Previously Presented) A method for analyzing at least one of bone mineral density, bone structure and surrounding tissue comprising:

a. obtaining an image of a subject;

b. locating a region of interest on the image;

c. obtaining data from the region of interest; and

d. deriving quantitative data from the image data obtained at step c, wherein the step of deriving includes extracting at least one of cartilage parameters, cartilage defect parameters, and diseased cartilage parameters, wherein the data extracted is selected from the group consisting of: mean cartilage thickness over substantially total surface; mean cartilage thickness in focal area; maximum cartilage thickness in focal area; minimum cartilage thickness in focal area; 3D cartilage shape information; cartilage curvature analysis; volume of cartilage defect/diseased cartilage; depth of cartilage defect/diseased cartilage; area of cartilage defect/diseased cartilage; at least one of 2D and 3D location of cartilage defect/diseased cartilage in the articular surface; at least one of 2D and 3D location of cartilage defect/diseased cartilage in relationship to weight- bearing area; a ratio of at least two of diameter of cartilage defect, diameter of diseased cartilage, and thickness of surrounding normal cartilage; a ratio of at least two of depth of cartilage defect, depth of diseased cartilage and thickness of surrounding normal cartilage; a ratio

of at least two of volume of cartilage defect, volume of diseased cartilage and thickness of surrounding normal cartilage; a ratio of at least two of surface area of cartilage defect, surface area of diseased cartilage and total joint surface area; and a ratio of at least two of volume of cartilage defect, volume of diseased cartilage and total cartilage volume.

15. (Original) The method of claim 1 wherein at least one step is performed automatically.

16. (Original) The method of claim 1 wherein at least one step is performed semi-automatically.

17. (Original) The method of claim 1 wherein at least one of the steps is performed on a first computer.

18. (Original) The method of claim 1 wherein at least one of the steps is performed on a first computer and at least one of the steps is performed on a second computer.

19. (Original) The method of claim 18 wherein the first computer and the second computer are connected by one of a peer to peer network, direct link, intranet, and internet.

20. (Original) The method of claim 1 wherein the step of locating a region of interest is repeated.

21. (Original) The method of claim 1 wherein the step of obtaining image data from a region of interest is repeated.

22. (Original) The method of claim 1 wherein at least one of the image and data is converted to a 2D pattern.

23. (Original) The method of claim 22 wherein the 2D pattern is evaluated.

24. (Original) The method of claim 22 wherein the 2D pattern is converted to a 3D pattern.

25. (Original) The method of claim 23 wherein the 2D pattern is converted to a 3D pattern.

26. (Original) The method of claim 22 wherein the 2D pattern is converted to a 4D pattern.

27. (Original) The method of claim 23 wherein the 2D pattern is converted to a 4D pattern.

28. (Original) The method of claim 25 wherein the 3D pattern is converted to a 4D pattern.

29. (Original) The method of claim 1 wherein at least one of the image and data is converted to a 3D pattern.

30. (Original) The method of claim 29 wherein the 3D pattern is evaluated.

31. (Original) The method of claim 29 wherein the 3D pattern is converted to a 2D pattern.

32. (Original) The method of claim 31 wherein the 3D pattern is converted to a 2D pattern.

33. (Original) The method of claim 29 wherein the 3D pattern is converted to a 4D pattern.

34. (Original) The method of claim 30 wherein the 3D pattern is converted to a 4D pattern.

35. (Original) The method of claim 31 wherein the 2D pattern is converted to a 4D pattern.

36. (Original) The method of claim 1 wherein the at least one of the image and data is converted to a 4D pattern.

37. (Original) The method of claim 36 wherein the 4D pattern is evaluated.

38. (Original) The method of claim 1 further comprising the step of administering a candidate agent.

39. (Original) The method of claim 38 wherein the candidate agent is at least one agent selected from the group consisting of: substance administered to a subject, substance ingested by a subject, molecules, pharmaceuticals, biopharmaceuticals, agropharmaceuticals.

40. (Original) The method of claim 1 further comprising the step of comparing the data obtained to a database.

41. (Original) The method of claim 1 further comprising the step of comparing the data obtained to a subset of a database.

42. (Previously Presented) The method of claim 1 further comprising the step of comparing the quantitative data to an image taken at T1.

43. (Previously Presented) The method of claim 1 further comprising the step of comparing the quanititative data to an image taken prior to the image under analysis.

44. (Previously Presented) The method of claim 1 further comprising the step of comparing the quantitative data to an image taken at Tn.

45. (Original) The method of claim 1 further comprising the step of transmitting at least one of the image and data.

46. (Original) The method of claim 45 further comprising the step of analyzing the converted image.

47. (Original) The method of claim 46 wherein the step of analyzing the converted image occurs at least at one of prior to transmitting the image or after transmitting the image.

48. (Original) The method of claim 1 wherein the image is converted to at least one of a pattern of normal, diseased, and normal and diseased.

49. (Original) The method of claim 1 wherein obtaining image data includes measuring at least one of microarchitecture and macroanatomical structures.

50. (Original) The method of claim 49 further comprising measuring the average density.

51. (Original) The method of claim 50 wherein the average density measurement includes a calibrated density of the region of interest.

52. (Original) The method of claim 49 further comprising measuring microanatomical structures on at least one of dental, spine, hip, knee and bone core x-rays.

53. (Previously Presented) A method for analyzing at least one of bone mineral density, bone structure and surrounding tissue comprising:

a. obtaining an image of a subject;

b. locating a region of interest on the image;

c. obtaining data from the region of interest; and

d. deriving quantitative data from the image data obtained at step c, wherein the step of deriving includes measuring at least one of: calibrated density of extracted structures; calibrated density of background; average intensity of extracted structures; average intensity of background area wherein the background area includes non-extracted structures; structural contract wherein structural contrast is an average intensity of extracted structures divided by an average intensity of a background; calibrated structural contrast wherein calibrated structural contrast is a calibrated density of extracted structures divided by a calibrated density of a background; total area of extracted structures; total area of a region of interest; an area of extracted structures normalized by a total area of a region of interest; a boundary length of an extracted area normalized by a total are of a region of interest; a number of structures normalized by an area of a region of interest; a trabecular bone pattern factor; a measurement of concavity and convexity of structures; a star volume of extracted structures; a star volume of background; and a number of loops normalized by an area of a region of interest.

54. (Original) The method of claim 49 further comprising measuring a distance transform of extracted structures.

55. (Original) The method of claim 54 wherein the measurement on the distance transform of extracted structures further comprises one or more of: an average regional maximum thickness; a standard deviation of regional maximum thickness; a largest value of regional maximum thickness; and a median regional maximum thickness.

Claims 56-88 (Cancelled)

89. (Previously Presented) The method of claim 12 further including the step of enhancing image data extracted from the region of interest.

90. (Previously Presented) The method of claim 12 wherein the subject is a mammal.

91. (Previously Presented) The method of claim 12 wherein the subject is a human.

92. (Previously Presented) The method of claim 12 wherein the subject is a horse.

93. (Previously Presented) The method of claim 12 wherein at least one step is performed automatically.

94. (Previously Presented) The method of claim 12 wherein at least one step is performed semi-automatically.

95. (Previously Presented) The method of claim 12 wherein at least one of the steps is performed on a first computer.

96. (Previously Presented) The method of claim 12 wherein at least one of the steps is performed on a first computer and at least one of the steps is performed on a second computer.

97. (Previously Presented) The method of claim 96 wherein the first computer and the second computer are connected by one of a peer to peer network, direct link, intranet, and internet.

98. (Previously Presented) The method of claim 12 wherein the step of locating a region of interest is repeated.

99. (Previously Presented) The method of claim 12 wherein the step of obtaining image data from a region of interest is repeated.

100. (Previously Presented) The method of claim 12 wherein at least one of the image and data is converted to a 2D pattern.

101. (Previously Presented) The method of claim 100 wherein the 2D pattern is evaluated.

102. (Previously Presented) The method of claim 100 wherein the 2D pattern is converted to a 3D pattern.

103. (Previously Presented) The method of claim 101 wherein the 2D pattern is converted to a 3D pattern.

104. (Previously Presented) The method of claim 100 wherein the 2D pattern is converted to a 4D pattern.

105. (Previously Presented) The method of claim 101 wherein the 2D pattern is converted to a 4D pattern.

106. (Previously Presented) The method of claim 103 wherein the 3D pattern is converted to a 4D pattern.

107. (Previously Presented) The method of claim 12 wherein at least one of the image and data is converted to a 3D pattern.

108. (Previously Presented) The method of claim 107 wherein the 3D pattern is evaluated.

109. (Previously Presented) The method of claim 107 wherein the 3D pattern is converted to a 2D pattern.

110. (Previously Presented) The method of claim 108 wherein the 3D pattern is converted to a 2D pattern.

111. (Previously Presented) The method of claim 107 wherein the 3D pattern is converted to a 4D pattern.

112. (Previously Presented) The method of claim 108 wherein the 3D pattern is converted to a 4D pattern.

113. (Previously Presented) The method of claim 109 wherein the 2D pattern is converted to a 4D pattern.

114. (Previously Presented) The method of claim 12 wherein the at least one of the image and data is converted to a 4D pattern.

115. (Previously Presented) The method of claim 114 wherein the 4D pattern is evaluated.

116. (Previously Presented) The method of claim 12 further comprising the step of administering a candidate agent.

117. (Previously Presented) The method of claim 116 wherein the candidate agent is at least one agent selected from the group consisting of: substance administered to a subject, substance ingested by a subject, molecules, pharmaceuticals, biopharmaceuticals, agropharmaceuticals.

118. (Previously Presented) The method of claim 12 further comprising the step of comparing the data obtained to a database.

119. (Previously Presented) The method of claim 12 further comprising the step of comparing the data obtained to a subset of a database.

120. (Previously Presented) The method of claim 12 further comprising the step of comparing the quantitative data to an image taken at T1.

121. (Previously Presented) The method of claim 12 further comprising the step of comparing the quantitative data to an image taken prior to the image under analysis.

122. (Previously Presented) The method of claim 12 further comprising the step of comparing the quantitative data to an image taken at Tn.

123. (Previously Presented) The method of claim 12 further comprising the step of transmitting at least one of the image and data.

124. (Previously Presented) The method of claim 123 further comprising the step of analyzing the converted image.

125. (Previously Presented) The method of claim 124 wherein the step of analyzing the converted image occurs at least at one of prior to transmitting the image or after transmitting the image.

126. (Previously Presented) The method of claim 12 wherein the image is converted to at least one of a pattern of normal, diseased, and normal and diseased.

127. (Previously Presented) The method of claim 12 wherein obtaining image data includes measuring at least one of microarchitecture and macroanatomical structures.

128. (Previously Presented) The method of claim 127 further comprising measuring the average density.

129. (Previously Presented) The method of claim 128 wherein the average density measurement includes a calibrated density of the region of interest.

130. (Previously Presented) The method of claim 129 further comprising measuring microanatomical structures on at least one of dental, spine, hip, knee and bone core x-rays.

131. (Previously Presented) The method of claim 14 further including the step of enhancing image data extracted from the region of interest.

132. (Previously Presented) The method of claim 14 wherein the subject is a mammal.

133. (Previously Presented) The method of claim 14 wherein the subject is a human.

134. (Previously Presented) The method of claim 14 wherein the subject is a horse.

135. (Previously Presented) The method of claim 14 wherein at least one step is performed automatically.

136. (Previously Presented) The method of claim 14 wherein at least one step is performed semi-automatically.

137. (Previously Presented) The method of claim 14 wherein at least one of the steps is performed on a first computer.

138. (Previously Presented) The method of claim 14 wherein at least one of the steps is performed on a first computer and at least one of the steps is performed on a second computer.

139. (Previously Presented) The method of claim 138 wherein the first computer and the second computer are connected by one of a peer to peer network, direct link, intranet, and internet.

140. (Previously Presented) The method of claim 14 wherein the step of locating a region of interest is repeated.

141. (Previously Presented) The method of claim 14 wherein the step of obtaining image data from a region of interest is repeated.

142. (Previously Presented) The method of claim 14 wherein at least one of the image and data is converted to a 2D pattern.

143. (Previously Presented) The method of claim 142 wherein the 2D pattern is evaluated.

144. (Previously Presented) The method of claim 142 wherein the 2D pattern is converted to a 3D pattern.

145. (Previously Presented) The method of claim 143 wherein the 2D pattern is converted to a 3D pattern.

146. (Previously Presented) The method of claim 142 wherein the 2D pattern is converted to a 4D pattern.

147. (Previously Presented) The method of claim 143 wherein the 2D pattern is converted to a 4D pattern.

148. (Previously Presented) The method of claim 145 wherein the 3D pattern is converted to a 4D pattern.

149. (Previously Presented) The method of claim 14 wherein at least one of the image and data is converted to a 3D pattern.

150. (Previously Presented) The method of claim 149 wherein the 3D pattern is evaluated.

151. (Previously Presented) The method of claim 149 wherein the 3D pattern is converted to a 2D pattern.

152. (Previously Presented) The method of claim 150 wherein the 3D pattern is converted to a 2D pattern.

153. (Previously Presented) The method of claim 149 wherein the 3D pattern is converted to a 4D pattern.

154. (Previously Presented) The method of claim 150 wherein the 3D pattern is converted to a 4D pattern.

155. (Previously Presented) The method of claim 151 wherein the 2D pattern is converted to a 4D pattern.

156. (Previously Presented) The method of claim 14 wherein the at least one of the image and data is converted to a 4D pattern.

157. (Previously Presented) The method of claim 156 wherein the 4D pattern is evaluated.

158. (Previously Presented) The method of claim 14 further comprising the step of administering a candidate agent.

159. (Previously Presented) The method of claim 158 wherein the candidate agent is at least one agent selected from the group consisting of: substance administered to a subject, substance ingested by a subject, molecules, pharmaceuticals, biopharmaceuticals, agropharmaceuticals.

160. (Previously Presented) The method of claim 14 further comprising the step of comparing the data obtained to a database.

161. (Previously Presented) The method of claim 14 further comprising the step of comparing the data obtained to a subset of a database.

162. (Previously Presented) The method of claim 14 further comprising the step of comparing the quantitative data to an image taken at T1.

163. (Previously Presented) The method of claim 14 further comprising the step of comparing the quantitative data to an image taken prior to the image under analysis.

164. (Previously Presented) The method of claim 14 further comprising the step of comparing the quantitative data to an image taken at Tn.

165. (Previously Presented) The method of claim 14 further comprising the step of transmitting at least one of the image and data.

166. (Previously Presented) The method of claim 165 further comprising the step of analyzing the converted image.

167. (Previously Presented) The method of claim 166 wherein the step of analyzing the converted image occurs at least at one of prior to transmitting the image or after transmitting the image.

168. (Previously Presented) The method of claim 14 wherein the image is converted to at least one of a pattern of normal, diseased, and normal and diseased.

169. (Previously Presented) The method of claim 14 wherein obtaining image data includes measuring at least one of microarchitecture and macroanatomical structures.

170. (Previously Presented) The method of claim 169 further comprising measuring the average density.

171. (Previously Presented) The method of claim 170 wherein the average density measurement includes a calibrated density of the region of interest.

172. (Previously Presented) The method of claim 171 further comprising measuring microanatomical structures on at least one of dental, spine, hip, knee and bone core x-rays.